

University of Puerto Rico
 Mayagüez Campus
 College of Engineering
 Department of Electrical and Computer Engineering
 Bachelor of Science in Electrical Engineering

Course Syllabus

1. General Information:	
Alpha-numeric codification: INEL 4405 Course Title: Electrical Machines Number of credits: 3 Contact Period: 45 Required in INEL	
2. Course Description:	
English: Electromechanical energy conversion ; induction, synchronous and direct current machines are studied Spanish: Conversión electromecánica de energía; maquinas de inducción, sincrónicas y de corriente directa son estudiadas	
3. Pre/Co-requisites and other requirements:	
INEL 4103	
4. Course Objectives:	
To introduce students to the fundamental concepts of electromechanical energy conversion and electric machines. After completing the course , the students will have a solid background on the construction, operation characteristics and the analysis of each of the electrical machines discussed	
5. Instructional Strategies:	
<input checked="" type="checkbox"/> conference <input checked="" type="checkbox"/> discussion <input checked="" type="checkbox"/> computation <input type="checkbox"/> laboratory <input type="checkbox"/> seminar with formal presentation <input type="checkbox"/> seminar without formal presentation <input type="checkbox"/> workshop <input type="checkbox"/> art workshop <input type="checkbox"/> practice <input type="checkbox"/> trip <input type="checkbox"/> thesis <input checked="" type="checkbox"/> special problems <input type="checkbox"/> tutoring <input type="checkbox"/> research <input checked="" type="checkbox"/> other, please specify: There will be laboratory demonstrations throughout the semester. Students must attend these demonstrations during the regular class period. Material from these demonstrations will be part of the class, and thus will be evaluated. Students may be asked to collect data from these demonstrations, analyze it and submit a report with the results of the analysis.	
6. Minimum or Required Resources Available:	
All students are expected to bring a solid background in circuit analysis and calculus. Students should also have basic knowledge of electromagnetic theory. Students must always bring to class the textbook and a scientific calculator (preferably one that handles complex numbers).	
7. Course time frame and thematic outline	
Outline	Contact Hours
Introduction	1
Student learning profile	
Review of three phase power systems connections and analysis, phasor diagrams representation	3
Three phase power measurements (Two Wattmeter Method)	4
Electromechanical energy conversion principles	5
Reluctance torque in rotating machines	2
Concepts, types and construction of basic rotating machines	3
Three phase induction machines	9
Single phase induction motors	2
Synchronous machines	7
Direct current machines	7
Exams	3
Total hours: (equivalent to contact period)	45
8. Grading System	
<input checked="" type="checkbox"/> Quantifiable (letters) <input type="checkbox"/> Not Quantifiable	
9. Evaluation Strategies (Suggested): The faculty member teaching the course will provide the student with the evaluation strategy he/she will be using throughout the semester. This will be done within the first week of	

classes.

	Quantity	Percent
<input checked="" type="checkbox"/> Exams	3	70
<input checked="" type="checkbox"/> Final Exam	1	20
<input checked="" type="checkbox"/> Short Quizzes	_____	5
<input type="checkbox"/> Oral Reports		
<input type="checkbox"/> Monographies		
<input type="checkbox"/> Portfolio		
<input type="checkbox"/> Projects		
<input type="checkbox"/> Journals		
<input checked="" type="checkbox"/> Other, specify: Homework	_____	5
TOTAL:		100%

10. Bibliography:

Textbook:

Bhag S. Guru, Huseyin R. Hiziroglu, Electric Machinery and Transformers, Third Edition, Oxford Press, 2000

References:

Theodore Wildi, Electrical Machines, Drives, and Power Systems, Third Edition, Prentice Hall, 1997

Donald V. Richardson, Arthur J. Caisse, Jr., Rotating Electric Machinery and Transformer Technology, Fourth Edition, Prentice Hall, 1997

11. According to Law 51

Students will identify themselves with the Institution and the instructor of the course for purposes of assessment (exams) accommodations. For more information please call the Student with Disabilities Office which is part of the Dean of Students office (Chemistry Building, room 019) at (787)265-3862 or (787)832-4040 extensions 3250 or 3258.

12. Contribution of Course to meeting the requirements of Criterion 5:

Math	Basic Science	General	Engineering Topic
			√

13. Course Outcomes

Map to Program Outcomes

- Possess sufficient knowledge of circuit analysis and electromagnetic principles to enable understanding of the physical operation of electric machines (a)
- Be able to apply linear algebra and phasor analysis concepts to descriptions and solutions of steady state electric machines engineering problems. (a)
- Be capable of extracting specifications and physical constraints from electrical machines engineering verbal problems. (a)
- Be capable of physical thinking, approximation and simplification of electric machines behavior as to perform laboratory test to compare actual results with theoretical ones (b)
- Be capable of effectively describing electrical machines steady state working conditions in a way that can lead to the construction of a solution. (e)
- Be capable to use the existing data acquisition module and computer programs to obtain and analyze the electric machines operation characteristics (k)

Person(s) who prepared this description and date of preparation: _____

Submitted by: Efrain O'Neill nov 2006

